

# MISSOURI CONSERVATIONIST

VOLUME 79, ISSUE 12, DECEMBER 2018  
SERVING NATURE & YOU





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Canada geese

## MISSOURI CONSERVATIONIST



### ON THE COVER

Eastern bluebird

📷 **NOPPADOL PAOTHONG**

500mm lens, f/8  
1/20 sec, ISO 800

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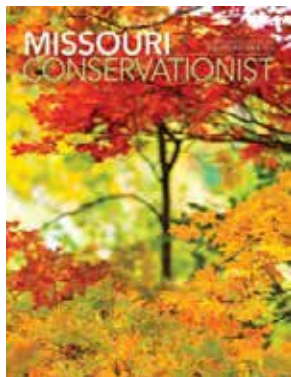
# Inbox



## Letters to the Editor

Submissions reflect readers' opinions and may be edited for length and clarity. Email [Magazine@mdc.mo.gov](mailto:Magazine@mdc.mo.gov) or write to us:

MISSOURI  
CONSERVATIONIST  
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JEFFERSON CITY, MO 65102



## FALLING FOR OCTOBER

Every month is wonderful, but this month was astounding! The stories and photos in *As Wild as it Gets* [Page 17] wowed and excited me. Thank you!

Kim Kraus  
via Email

## LOVE FOR OCTOBER CONSERVATIONIST

I have enjoyed every page of this issue. Every article was timely and interesting. Keep up the good work.

Mary Margaret Bayer Columbia

This is my favorite magazine. I sometimes squeal out loud when I find it in my mailbox!

Jenny Murphy via Facebook

## LONGTIME READER

I love getting my monthly magazine. I started getting it when my children were young. It's a wonderful tool to keep people informed of the importance of our resources. The *What Is It* section is fun and often a great discussion piece.

Peg Lewis St. Louis

*We appreciate your loyal readership and enthusiasm for the Missouri Conservationist! Each month, we strive to serve you with stories that help you learn more, enjoy more, and do more for our state's fish, forest, and wildlife. We welcome your continued feedback, whether by social media, email, or the United States Postal Service. You can reach us via Facebook at [Facebook.com/moconservation](https://www.facebook.com/moconservation), by email at [magazine@mdc.mo.gov](mailto:magazine@mdc.mo.gov), or by regular mail at Missouri Conservationist, PO Box 180, Jefferson City, MO 65102. We love hearing from you, and it is your correspondence that helps fill this very page! Thanks for taking the time to drop us a line.*

—THE EDITORS

## BARRED OWL

The barred owl on the [November issue] back cover brings to mind all the wonderful times in our preferred Missouri stomping grounds. Especially at our cabin at Mark Twain Lake, where a barred owl was an occasional evening visitor at the top of our fireplace flue cap. He or she could loudly keep us awake nights! However, that never prevented

us from early morning fishing or kayaking the beautiful lake or Salt River. It's hard to say goodbye to the great Missouri outdoors after 65-plus years! Thanks for many years of wonderful *Missouri Conservationist* issues that educated us about fishing, hunting, hiking, nature, land management, wildlife, and the importance of conservation of these Missouri treasures.

Steve & Sue Kurtz O'Fallon & Paris, Missouri

## REBEL'S COVE

I enjoyed your article on Rebel's Cove Conservation Area [November, Page 30].

In the mid '70s and '80s, we made several trips a year to Rebel's Cove for pheasants. We had to work for them, but usually found birds. The best spot was to turn in at the first sign and drive down to the bottoms, and then hunt the entire area and only stop long enough for lunch and to rest the dogs.

This was all back in my younger days when walking was no effort. This area really holds a lot of memories for me. In the early part of the season, it was not uncommon for the dogs to run across snakes as some of the grassy areas were wet and swampy.

Jim Blakley Sr. Moberly

*Though pheasants aren't as numerous as they once were at Rebel's Cove Conservation Area, there is still a fair population for hunting in north Missouri.*

—THE EDITORS

## CORRECTION

An insect pictured on Page 4 of the November issue [*Nature Lab*] was misidentified as a mayfly nymph. It should have been identified as a stonefly nymph. We apologize for the error. —THE EDITORS



Stonefly nymph

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### Want to see your photos in the Missouri Conservationist?

Share your photos on Flickr at  
flickr.com/groups/mdcreaderphotos-2018,  
email Readerphoto@mdc.mo.gov,  
or include the hashtag #mdcdiscovernature  
on your Instagram photos.



1

1 | Delaney Lake  
Conservation Area  
by **Robert Hearnese**,  
via Flickr

2 | Snowflakes by  
**Abhi Gupta**, via email

3 | Winter trout  
fishing by  
**chethicksphotography**,  
via Instagram



2



3

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# Up Front

with Sara Parker Pauley

✱ 'Tis the season of giving in the spirit of the holidays. Yet there are those who don't limit giving to a particular season but answer the call to make a difference year-round. As Winston Churchill said, "We make a living by what we get. We make a life by what we give."

As I look back over the year, I'm reminded of countless stories of those who give their most precious resource — their time — to further conservation. One such example is Dan Fuller, who invited me to speak at the annual banquet of Young Outdoorsmen United this past spring. His posse of passionate volunteers host this fundraising event so that they may provide opportunities for youth and their families to engage in outdoor activities all year long. These dedicated volunteers are likely aware of what the research tells us about how giving your time and talents reduces stress, positively increases mental and physical health, and promotes longevity. But they are also driven by something more — seeing a need and doing something about it.

On Page 18, you'll read inspiring stories of conservation volunteers across Missouri assisting agencies, organizations, and communities by stepping up and giving more of themselves. They truly embody the spirit of the giving season by making a lasting difference every day of the year. Happy holidays, conservation family! Thank you for all you give year-round.

*Sara Parker Pauley*

**SARA PARKER PAULEY**, DIRECTOR  
SARA.PAULEY@MDC.MO.GOV

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[mdc.mo.gov](http://mdc.mo.gov) 3

# Nature LAB

by Bonnie Chasteen

Each month, we highlight research MDC uses to improve fish, forest, and wildlife management.

## SPECIES OF CONSERVATION CONCERN

### Swamp Rabbit Surveys

✳ Unless you live in the Bootheel, you may not have heard of the swamp rabbit (*Sylvilagus aquaticus*). This cottontail cousin lives in bottomland hardwood forests, where it can dive into the swamp to escape predators. It is also a Missouri species of conservation concern, ranked imperiled in our state.

Former MDC Natural History Biologist Bruce Henry explained why. “Missouri is at the very north-western edge of the rabbit’s range, so steep declines in bottomland hardwood forests in our state make it vulnerable to loss.”

Henry and other members of the multipartner swamp rabbit working group use an unusual survey method to track the rabbits.

“We check their latrines,” he said.

Swamp rabbits defecate atop logs and stumps, leaving easy-to-spot evidence of their presence. The working group keeps a database of nearly 300 latrine sites along major floodplains between St. Louis and Oregon counties.

In addition to surveying Missouri’s known latrine sites every 10 years, the group tracks the rabbit’s response to extreme disturbances, such as the Birds Point-New Madrid Levee breach in 2011.



Biologists conduct latrine surveys in the winter when it’s easier to spot downed logs in the Bootheel’s bottomland hardwood forests.

Tracking the rabbit’s presence helps managers conserve them and their habitat

“We surveyed all 65 sites in Mississippi and New Madrid counties from 2011 to 2016,” said Dr. John Scheibe, professor of biology at Southeast Missouri State University. “Our analysis showed that, while the population had recovered pretty quickly, the system was not yet as stable as it had been prior to the flooding event.”

Will the Birds Point-New Madrid floodway population reach preflood numbers? Future surveys will tell.



## Swamp Rabbit Surveys At a Glance

### Survey Frequency

Every 10 years since 1991 and as needed to track major disturbances

**300**

Missouri Latrine Sites

### Swamp Rabbit’s Ecological Value

Habitat indicator. If Missouri’s bottomland hardwood forest disappears, so does the rabbit.

### Missouri Swamp Rabbit Working Group

- ✳ MDC
- ✳ Missouri Department of Natural Resources
- ✳ Natural Resources Conservation Service
- ✳ Southeast Missouri State University
- ✳ U.S. Fish & Wildlife Service



# In Brief

News and updates from MDC



## DISCOVER NATURE WITH EAGLE DAYS

LOCAL EVENTS HOSTED TO CELEBRATE THE RETURN OF OUR NATIONAL BIRD

➔ With our big rivers, many lakes, and abundant wetlands, Missouri is one of the leading lower 48 states for eagle viewing. Get out this December through February and enjoy these magnificent birds on your own or at one of MDC's Eagle Days events, located around the state.

Each fall, thousands of eagles migrate south from their nesting range in Canada and the Great Lakes states to hunt in the Show-Me State. Eagles take up residence wherever they find open water and plentiful food. More than 2,000 bald eagles are typically reported in Missouri during winter.

MDC Eagle Days events are listed below. Events include live captive-eagle programs, exhibits, activities, videos,

and guides with spotting scopes. Watch for eagles perched in large trees along the water's edge. View them early in the morning to see eagles flying and fishing. Be sure to dress for winter weather and don't forget cameras and binoculars.

- **Mound City:** Dec. 1 from 9 a.m. to 4 p.m. and Dec. 2 from 10 a.m. to 4 p.m. at Loess Bluffs National Wildlife Refuge near Mound City. Call 816-271-3100 for more information.
- **Kansas City:** Jan. 5 from 9 a.m. to 3:30 p.m. and Jan. 6 from 10:30 a.m. to 3:30 p.m. at Smithville Lake Paradise Pointe Golf Course Clubhouse, north of Kansas City. Call 816-532-0174 for more information.
- **St. Louis:** Jan. 19 and 20 from 9 a.m. to 3 p.m. at the Old Chain of Rocks Bridge, south of I-270 off Riverview Drive. Call 314-301-1500 for more information.
- **Springfield:** Jan. 19 from 9 a.m. to 4 p.m. and Jan. 20 from 12:30 to 4:30 p.m. at Springfield Conservation Nature Center. Call 417-888-4237 for more information.
- **Clarksville:** Jan. 26 from 9 a.m. to 4 p.m. and Jan. 27 from 10 a.m. to 3 p.m. at Lock and Dam 24 and Apple Shed Theater. Call 660-785-2424 for more information.
- **Jefferson City:** Jan. 26 from 10 a.m. to 3 p.m. at Runge Conservation Nature Center. Call 573-526-5544 for more information.
- **Puxico:** Feb. 2 from 9 a.m. to 3 p.m. at Mingo National Wildlife Refuge. Call 573-222-3589 for more information.

*Eagle Days continued on Page 6 »*



## EAGLE DAYS (continued)

Can't make an Eagle Days event? Here are some hot spots for winter eagle viewing on your own:

- Lake of the Ozarks at **Bagnell Dam Access**, east of Bagnell
- **Eagle Bluffs Conservation Area** on Route K, southwest of Columbia
- **Lock & Dam 20**, Canton
- **Lock & Dam 24** at Clarksville
- **Lock & Dam 25**, east of Winfield
- **Mingo National Wildlife Refuge**, northwest of Puxico
- **Old Chain of Rocks Bridge**, south of I-270, off of Riverview Drive, St. Louis
- **Riverlands Environmental Demonstration Area**, east of West Alton
- **Schell-Osage Conservation Area**, north of El Dorado Springs
- **Smithville Lake**, north of Kansas City
- **Loess Bluffs National Wildlife Refuge**, south of Mound City
- **Stella** at Moses Eagle Park
- **Swan Lake National Wildlife Refuge**, south of Sumner
- **Table Rock Lake** and **Shepherd of the Hills Fish Hatchery**, southwest of Branson
- **Truman Reservoir**, west of Warsaw

For more information on bald eagles, visit the MDC online *Field Guide* at [short.mdc.mo.gov/ZpY](http://short.mdc.mo.gov/ZpY) For more information on Eagle Days, visit [mdc.mo.gov/EagleDays](http://mdc.mo.gov/EagleDays).

## Wild Webcast

Mark your calendar for Wild Webcast: Bald Eagles and Eagle Days Dec. 4 from noon to 1 p.m. Join MDC Resource Scientist Janet Haslerig and Media Specialist Dan Zarlenga as they discuss bald eagles and the perennially popular MDC Eagle Days events. To register, visit [short.mdc.mo.gov/ZT7](http://short.mdc.mo.gov/ZT7).

# Ask MDC

## Got a Question for Ask MDC?

Send it to [AskMDC@mdc.mo.gov](mailto:AskMDC@mdc.mo.gov)  
or call 573-522-4115, ext. 3848.

### Q: Hawks can be challenging to identify. How can I tell the difference between Cooper's hawks and sharp-shinned hawks?

➔ With their steely blue-gray coloring above and reddish bars below, adult Cooper's hawks (*Accipiter cooperii*) and sharp-shinned hawks (*Accipiter striatus*) not only resemble one another, they also have similar habits. Even expert birders don't always have a definite answer. But with a careful eye, it's possible to notice some differences. Here are a few clues:

- Cooper's hawks are slightly larger than sharp-shinned hawks, both in length and wingspan. Cooper's hawks are about the size of a crow, while sharpies are the size of a blue jay.

- Both birds have long tails they use as rudders to navigate through dense woodlands. But

a Cooper's hawk's tail is slightly rounded and a sharp-shinned hawk's is squared off at the tip and sometimes notched.

- Cooper's hawks have big, blocky heads, compared with sharp-shinned hawks' petite, rounded pates. Also, Cooper's have black caps of feathers, but their nape (back of the neck) feathers are lighter. Sharpies' heads and napes are slate blue-gray. Additionally, when in flight, a sharp-shinned hawk's small head does not always project beyond the "wrists" of the wings.

- Sharp-shinned hawks are daring, acrobatic aerial divers capable of surprising prey with a rush of speed. Cooper's hawks are similarly powerful, quick and agile, but their flight tends to be more direct. Both follow a flap-flap-glide pattern.

- Both birds occupy the same kind of habitat: dense forests, forest edges, and even

leafy subdivisions. Because they prey on songbirds, it's not uncommon to see them near backyard feeders. However, Cooper's hawks are found in Missouri year-round. Sharpies are most often seen here during migration and in winter.







Squirrel prunings

**Q: I've noticed many severed branches under some of the cedar trees on my property. Can you tell me what animal is causing this?**

➔ It's likely a squirrel. Late winter is the most critical time for squirrels because much of the nut crop has been depleted and new spring growth has made little progress. Bark, immature buds,

juniper berries, and even twigs are taken as emergency foods.

A closer look at the buds may reveal the centers have been eaten out. Rather than just eating the buds, these rodents prefer to first prune the branch tip from the tree, eat the bud, then discard the branch. As the squirrel continues to dine, the branch tips pile up on the ground below.

## AGENT ADVICE

from

**Tyler Mason**

HOWARD COUNTY  
CONSERVATION AGENT

If you're looking for a way to stay afield as deer season winds down, try trapping. Furbearer numbers are high in Missouri, and trapping is one way to help manage those populations.

Trappers need a permit, available through local vendors, online at [mdc.mo.gov/permits](https://mdc.mo.gov/permits), or through MDC's free MO Hunting app. Trappers are required to affix their name, address, or conservation ID number permanently to each trap set. Traps should be checked within a 24- to 48-hour window, depending on species. If you harvest an otter or bobcat, it must be tagged by an agent no later than April 10. For more information, consult *A Summary of Missouri Hunting and Trapping Regulations* booklet or visit [short.mdc.mo.gov/ZpG](https://short.mdc.mo.gov/ZpG).



## What IS it?

Can you guess this month's natural wonder?

The answer is on  
Page 9.







## CHRISTMAS COOKIES

The holidays usher in a season of family, friends, and lots of food. Baked goods — particularly cookies — make it to the top of the list. Here we feature two different kinds of cookies that incorporate Missouri's wholesome, hearty nuts. These are sure to be crowd pleasers!



### Zimmerschied (German Brown Sugar Cookies)

MAKES ABOUT 10 DOZEN COOKIES

#### INGREDIENTS:

1 cup butter  
1 teaspoon vanilla  
1 cup dark brown sugar, packed  
2½ cups flour  
1 teaspoon baking soda  
Pinch of salt  
1 cup Missouri black walnuts, chopped

**PREHEAT** oven to 350 degrees F.

**CREAM** butter, vanilla, and sugar thoroughly. In another bowl, mix flour, soda, and salt.

**COMBINE** dry and wet ingredients, adding walnuts last.

**SHAPE\*** into rolls, seal tightly, and refrigerate overnight.

**SLICE** about ⅓-inch thick and bake on ungreased baking sheets 15 to 20 minutes or until bottoms are nicely browned.

#### \*A NOTE ABOUT SIZE AND NUMBER ...

*Four rolls yield smaller cookies — about an inch across. You could make fewer rolls and, consequently, larger cookies; however, they are very rich and the one-bite size seems perfect.*

### Date and Nut Bars

MAKES 2 TO 3 DOZEN BARS

#### INGREDIENTS:

½ cup coarsely chopped black walnuts  
½ cup coarsely chopped pecans  
½ cup dates, pitted and chopped  
¾ cup sifted flour, plus 1 tablespoon  
3 eggs  
1½ cups brown sugar, firmly packed  
¾ teaspoon baking powder  
¼ teaspoon salt  
⅓ cup powdered sugar, sifted  
A bit of butter for greasing pan

**PREHEAT** oven to 350 degrees F. Butter a 9- by 12-inch pan, line it with parchment paper, and butter the paper.

**COMBINE** nuts and dates in a small bowl. Add 1 tablespoon flour and mix with fingers until dates are coated and mixed with nuts. Set aside.

In another bowl, **BEAT** eggs, add sugar gradually, and continue beating until fluffy. Sift together remaining flour, baking powder, and salt. Add to egg mixture and stir until well mixed. Stir dates and nuts into the batter.

**SPREAD** over parchment paper and bake for 30 minutes or until cake rebounds to the touch when pressed gently in the center. Cool slightly, turn gently out of pan, and cut the longer dimension into 1-inch-wide strips. Then cut each strip into thirds or fourths. Gently dab bars in powdered sugar while they are still warm.





## GIVE THE GIFT OF NATURE

MDC's online Nature Shop makes holiday shopping a breeze for anyone interested in nature-themed gifts. Or skip retail stores and visit one of our nature centers in Kirkwood, Cape Girardeau, Springfield, Kansas City, Blue Springs, and Jefferson City for a surprising array of reasonably priced holiday gifts.

Discover nature every day, all year long, with our *2019 Natural Events Calendar*, on sale now for \$9 plus tax. The annual offering features stunning nature photography and daily notes about wild happenings — and makes a fun and informative holiday gift. The perennially popular calendar measures 10 by 14 inches folded and 20 by 14 open. Along with amazing images of native animals, plants, and places, it also includes phases of the moon, numerous holidays and days of recognition, daily notes about natural events, and more.

The *2019 Natural Events Calendar* and other offerings are available at MDC nature centers and regional offices, through our online Nature Shop at [mdcnatureshop.com](http://mdcnatureshop.com), or by calling 877-521-8632. Customers can get a 15 percent discount using their MDC Heritage Card or Permit Card.

## CITIZEN SCIENTISTS NEEDED: GET INVOLVED IN THE CHRISTMAS BIRD COUNT

MDC encourages experienced birders to become citizen scientists by helping with the National Audubon Society's 119th Annual Christmas Bird Count (CBC) between Dec. 14 and Jan. 5, which includes about 20 counts in Missouri.

The CBC is an early-winter bird census where thousands of volunteers across the U.S., Canada, and many countries in the Western Hemisphere go out over a 24-hour period on one calendar day to count birds. Christmas Bird Counts are held annually to gather data on winter bird populations and to track the long-term status of species and large-scale trends. Each CBC has a coordinator that assigns portions of a 15-mile diameter count circle to participants to count all birds seen and heard.

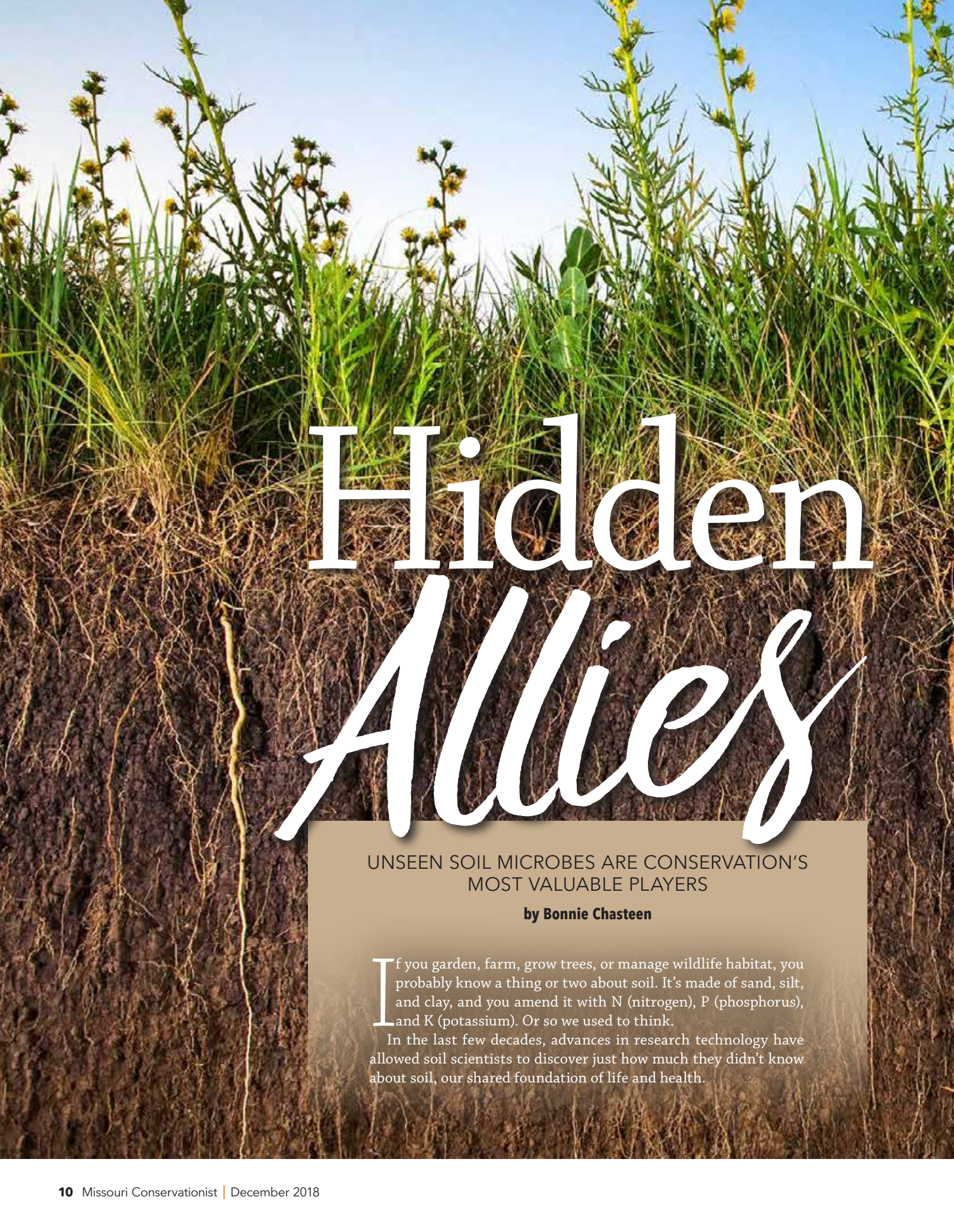
For more information, visit [tinyurl.com/ybropbvq](http://tinyurl.com/ybropbvq).

## WHAT IS IT? PURPLE FINCH

Present in Missouri from October through April, purple finches (*Haemorhous purpureus*) are common in cities and towns, around farms, and in suburban areas, foraging on the ground or in trees. They frequent bird feeders in large flocks, especially in winter, in search of sunflower and millet seeds. Males are raspberry red, with brown-streaked wings, while females are heavily streaked with brown feathers.





A vertical cross-section of soil. The top half shows green grass and plants with yellow flowers. Below the surface, a dense network of brown roots is visible against a dark brown soil background. The title 'Hidden Allies' is overlaid in white text, with 'Hidden' in a serif font and 'Allies' in a script font.

# Hidden *Allies*

UNSEEN SOIL MICROBES ARE CONSERVATION'S  
MOST VALUABLE PLAYERS

**by Bonnie Chasteen**

**I**f you garden, farm, grow trees, or manage wildlife habitat, you probably know a thing or two about soil. It's made of sand, silt, and clay, and you amend it with N (nitrogen), P (phosphorus), and K (potassium). Or so we used to think.

In the last few decades, advances in research technology have allowed soil scientists to discover just how much they didn't know about soil, our shared foundation of life and health.





Sticky, threadlike fungi supply roots with nutrients and hold soil particles together.



Parasitic nematodes hurt roots.



Predator nematodes control parasitic nematodes.



Along with fungi, bacteria protect roots from disease.





University of Missouri life sciences student Sera Holland collected soil samples at Lead Mine Conservation Area to conduct an experiment testing the role of soil microbial communities in the drought-resistance of native grassland plants.

**"Over the years, we've done a good job of characterizing soil's physical and chemical properties, but not the biological aspects,"**

said Dr. Randy Miles, associate professor emeritus of soil science at the University of Missouri's College of Agriculture, Food & Natural Resources. "We didn't know a lot about soil microbes. Now, with new instrumentation and better analytical capabilities, we can do the work much faster and more reliably."

MDC Resource Scientist Elizabeth Middleton agrees. "In the last 10 years, people have woken up to the importance of the soil community in sustaining life."

This awakening is spreading worldwide. From Ozark, Missouri, to Melbourne, Australia, people are discovering the invisible creatures that run the world and how we can take better care of them. After all, our lives depend on it.

### Microbes Help Roots Fix Soil

This discovery is changing the way everyone — from home gardeners to large-scale timber managers — thinks about soil management. Fundamentally, it enables them to rely more on plant and soil organic matter management and less on tillage, engineering, and inputs like fertilizer, herbicides, and pesticides.

Wayne Lovelace is president of Forrest Keeling, a native plant nursery in Elsberry. His company is a Missouri partner for soil health, and he has participated in testing various methods of encouraging the soil food web, especially using mycorrhizae, a type of threadlike fungi that interacts

with roots. Results show that soils with a higher fungi-to-bacteria ratio are better for plant growth.

"We found that restoring the soil microbial community can be done fairly quickly, and the payback, of course, is the input costs are greatly reduced," he said.

In addition, he said, restoring soil health "carries through to healthy wildlife and people. The whole cycle sort of comes together."

### The Soil Food Web Comes to Light

Last fall, 220 people gathered at St. Louis Community College's Meramec Campus for Grow Native!'s Soil Health Workshop. In the afternoon session, soil ecologist Dr. Elaine Ingham, author of the United States Department of Agriculture's *Soil Biology Primer*, introduced attendees to the soil food web and its role in creating and sustaining healthy soil.

"What organisms are in the soil? Which help? Which hurt? How can we manage them?"

Using a diagram of simple drawings, she presented a living network of bacteria, fungi, microbes, arthropods, and larger life-forms like mammals, reptiles, and birds.





## A Cast of Billions

Soil microbes occur wherever there's organic matter like leaf litter and roots, mostly in the top few inches of the soil. In the soil food web, organic matter, including plant roots, are the producers. They support countless microbes, including primary consumers (bacteria and fungi) and secondary consumers (protozoa and nematodes), which interact with higher-level consumers (worms, bugs, birds, and mammals). Bacteria and fungi (also known as mycorrhizae) help break rock into sand, silt, and clay, and they're the first in line to decompose organic matter, making nutrients available to plants.

The interactions between plants and the soil microbial community — especially decomposing organisms — create soil that strengthens roots and serves as a slow-release reservoir for water and nutrients. This dynamic sustains life as we know it, and it's the basis of all conservation efforts.



### Missouri Partners for Soil Health

Many Missouri entities are partnering to help people discover how soil microbes, our hidden allies, work with plants — especially native plants — to improve soil, water, and wildlife conservation. Partners include federal, state, and local natural resource management agencies and the University of Missouri System. Many nonprofits, professional associations, private businesses, and individual operators are also involved.

Breakthrough soil research and proven management practices represent "the best conservation opportunity of our lifetime," said MDC's Private Land Services Division Chief Bill White. To find local partners that can help you improve and sustain your land's soil food web, contact your nearest NRCS or Soil and Water Conservation District office.

## The *Five* Rules of Soil Health

Although years of private and public research have brought the soil food web to light, it doesn't take a Ph.D. in soil microbiology to conserve soil and water like a pro. Whether you're starting a construction project, growing trees, landscaping, managing stormwater, restoring wildlife habitat, or growing crops and livestock, follow these five rules to build soil health and improve soil, water, and wildlife conservation.

### Rule 1: Minimize Soil Disturbance and Control Erosion



After seeding exposed slopes, lay down natural-fiber erosion-control fabric to protect the soil. Seeds will sprout right through it.

Anytime you disturb soil, whether with a shovel, plow, bulldozer, or continuously grazing livestock, you expose it to the erosive forces of water and wind. Although agencies have been discouraging soil disturbance since the Dust Bowl days, "erosion by water is still a major problem," said Doug Peterson, Natural Resources Conservation Service (NRCS) regional soil health specialist for Missouri and Iowa.

This is especially true if your land is hilly or your construction project is on a slope. One of the best erosion-control methods is sowing annual cover crops like oats and radishes immediately after disturbance. They germinate and grow quickly, covering bare soil and stabilizing it against stormwater runoff and high winds.

When it comes to row-crop farming, combining cover crops with no-till planting practices can "address the root problem of erosion and loss of soil fertility," said Peterson.

For construction projects where the grounds will be sown with a native plant seed mix, MDC Community Conservation Planner Ronda Burnett advises using fast-growing annual cover crops immediately following construction.

"This can protect your budget and peace of mind," she said.

Native plant seed mixes have a limited window of time when they can be sown. If project delays close that window, you're stuck with an expensive delivery of native seed. You must either sow it and hope for the best, or find a suitable place to store it until the next planting opportunity.

"Using temporary cover crops is a great way to avoid a stressful situation and give the permanent native cover its best chance for success," Burnett said.

### Rule 2: Maximize Organic Matter

Leaf litter, dying plants, decomposing animals, and the microbes themselves make up organic matter. "Up to 50 percent of soil's organic matter can come from microorganisms," Peterson said.

No-till soybean field



This is important because it's the interaction between dead plant matter, roots, minerals, and microbes that creates a stable, porous soil that can absorb water.

Ben Anderson and his family raise corn and soybeans near Rocheport. They have used no-till with cover crops exclusively since the early '90s, when Anderson's father-in-law was looking for a way to control erosion on the family's highly erodible acres. "He got tired of seeing creeks run muddy," Anderson said. As the family got further into it, they realized there was more going on than erosion control. Through soil sampling and participating in MFA's Nutri-Track program, they saw that "increasing organic matter increased the number of good bugs on our farm that did some of the work for us." This work included natural tillage, reducing compaction, and increasing infiltration.

"It's been a drought year," Anderson said, "But no-till and cover crops help us keep what rain we've gotten."



#### Great spangled fritillary on purple milkweed



### Rule 3: Maximize Soil Microbe Diversity and Numbers

Boost microbe diversity by boosting plant diversity, especially those that naturally occur on your soil type. If you have clay, cultivate water-loving plants like those found in a wet prairie or wetland. If you have loam, encourage forest and woodland plants. If you have dry, rocky soil, give it glade (desertlike) plants, such as New Jersey tea, glade coneflower, aromatic aster, and cliff goldenrod.

But there's a caveat to this rule if you're trying to restore a natural community like a prairie or glade. Some plants can't live without their associated soil fungi. For example, many milkweed species need a specific type of mycorrhizal fungi to thrive.

This critical plant-fungi relationship is helping scientists like Middleton realize that the soil community may hold the answer for better prairie restoration. "The science is working really hard to catch up to our needs," she said. She and other Missouri soil-health partners are conducting studies comparing effects of whole soil treatments with those of cultured fungal inoculants. The *Conservationist* will report on their results in the near future.

Many Missouri native plants like this common milkweed need their native soil community to thrive. "Milkweeds grow really puny without mycorrhizae," said MDC Resource Scientist Elizabeth Middleton.

### Rule 4: Maximize Water Infiltration, Percolation, and Retention

Again, plants are the answer, and the longer the root system, the better.

Deep-rooted native plants, in particular, will eventually loosen soil, even stubborn clay, allowing better infiltration and retention. "This happens because plant residues and soil microbes secrete compounds that make soil particles hold together," said MDC Policy Coordinator Stuart Miller. "This stability creates conditions that improve the aeration, infiltration, percolation, and retention of water. It's a feedback loop."

To improve soil's structure and its ability to absorb, hold, and slowly release water, more municipalities are specifying native-plant bioswales in their stormwater-control projects, and developers are learning how to design and install them. Forrest Keeling's Lovelace supports this widespread change in stormwater management.

"We're concerned about trying to do the best we can to help clients slow down water, especially in flood plains," Lovelace said.

This native-plant rain garden, one of many at MDC's Central Regional Office in Columbia, captures rain from the roofs and allows it to slowly percolate into the soil.







A livestock producer raises a strand of electric fence to let his cattle onto fresh grass. Rotational grazing allows producers to practice all five rules of soil health — and produce fat cows.

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#### **Rule 5: Minimize Compaction**

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Just like animals above ground, soil microbes need space and air in their environment to survive and thrive. Crushing their habitat with heavy equipment and continuous livestock grazing compacts the soil and kills them. To keep your soil food web alive and healthy, keep heavy equipment off growing areas, and practice rotational grazing if you manage livestock. As Peterson said, “Good grazing management is one of a handful of practices that can correct erosion, flooding, poor soil function, and poor water infiltration.”

In rotational grazing systems, managers move tight groups of livestock quickly through a series of small pastures, each with its own water supply. The cows don’t stay in a paddock long enough to trample the ground deeply, and they don’t have enough time to graze vegetation down to bare dirt. They also defecate as they go, leaving manure as natural fertilizer.

“On grasslands, we use fences and short grazing periods to mimic the historic forces of fire and predators,” said Peterson.

Because native prairies, with their deep-rooted plants and super-absorbent soil, evolved under intense-but-short periods of grazing, rotational systems can help livestock producers restore soil function and health on their grasslands.

If you can work a rotational grazing system into your livestock operation, your grassland soil will be the better for it, Peterson said. ▲

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*Bonnie Chasteen is the Conservationist’s associate editor. The stains on her #SoilYourUndies test revealed her backyard soil is leaky, so she is planting more native plants.*



# #SoilYourUndies



Yes, folks, this is a real thing. A Canadian 4-H student developed an ingenious way to check your dirt for signs of life. All you need to do is soil your undies. Grab a new pair of 100-percent white cotton underwear and bury it in the top 6 inches of your soil. Mark the spot and mark your calendar. In two months, dig up your drawers. If they're mostly

gone, your soil is full of hungry critters. If they're in shreds but stained, your soil is leaching nutrients. Feed your soil critters the right plants and lots of organic matter, and they'll do a better job for you, your land, your streams, and your wildlife.



Your soil is full of hungry critters.



Your soil is leaching nutrients.

Two months later:



## If You're Serious About Assessment ...

Get in touch with University of Missouri's Soil Health Assessment Center in the College of Agriculture, Food & Natural Resources. Soil characterization services include physical, chemical, and biological properties of soil for farmers, landowners, researchers, consulting firms, state agencies, and landscape architects. Visit [cafnr.missouri.edu/soil-health](http://cafnr.missouri.edu/soil-health).









# DISCOVERING NATURE THROUGH VOLUNTEERING

MDC VOLUNTEERS TURN TIME, PASSION INTO WEALTH OF NATURE KNOWLEDGE

by Larry Archer | photographs by Noppadol Paothong





**W**hen Michael O’Keefe approached the staff at Burr Oak Woods Conservation Nature Center, Blue Springs, about becoming a volunteer, he brought with him little more than an interest in his newfound birding hobby and a desire to learn.

“Someone gave me a birdfeeder at some point for Christmas, which led to some seed and a book and trying to learn more,” O’Keefe said. “Next thing I knew, I had an encyclopedia of birds and then my wife suggested, ‘Well, Burr Oak Woods is just a couple miles away, and they have a volunteer program opening up.’”

From that beginning in 2000, O’Keefe has progressed from birding novice to leading staff volunteers in the center’s bluebird monitoring program and apprenticing in the bird banding program with the Missouri River Bird Observatory, headquartered in Marshall.

O’Keefe is one of approximately 2,000 staff volunteers who work at MDC’s nature centers and shooting ranges, according to Syd Hime, MDC volunteer and interpretive program manager. This volunteer corps is MDC’s “front line of customer service,” whether they’re at the front desk of a conservation nature center or on the firing line of a shooting range, she said.

“We actually have more volunteers than we do employees, so they’re instrumental in helping us reach our goals and support our mission,” Hime said.

While many of those volunteers come equipped with a wealth of conservation knowledge or outdoor skills — either through a specialized education or a lifetime of experience — others, like O’Keefe, come with just the desire to learn and serve.

As long as volunteers bring that desire, MDC can provide the expertise, said Hime.

“All of our staff volunteers go through some training,” Hime said. “If they just have an interest, absolutely there’s a place for them. Even in their role as volunteers, they’re learning and growing their skills, just through the interactions with staff, with the public, just being a volunteer. So there isn’t a required knowledge level or skill level to come on as a volunteer, there’s just the interest.”



**MICHAEL O'KEEFE**  
Volunteer



**BRIDGET TAM**  
Volunteer



**CINDY TAYLOR**  
Volunteer



**LINDA STRAUCH**

**JIM STRAUCH**  
Volunteer

## FALLING INTO NATURE

As a girl, Bridget Tam enjoyed the outdoors, especially fishing with her grandfather. But as an adult, her volunteering efforts were focused elsewhere until a requirement for a class at Southeast Missouri State University in 2015 set her on a course to the Cape Girardeau Conservation Nature Center (CNC).

“I’ve volunteered since I was 18, but most of that was in either language or education or youth, and I had never really done anything with the environment or conservation,” said Tam. “I thought, I’m really interested in that, and Missouri is one of the most beautiful states I’ve ever been in.”

Like O’Keefe, Tam had a general interest in nature, but no specialized outdoor knowledge or experience. Through volunteer training and assisting MDC naturalists with their programs, her scope of outdoor knowledge has expanded significantly, eventually making her the go-to volunteer on questions concerning native plants and landscaping.

“You never know what you’re going to learn or fall into,” she said. “And then you show up sometimes and they don’t need help with what you came to help with, but then you end up doing something you had no idea you’d be learning about.”

With her college career complete, Tam is taking her new degree and her experience volunteering at Cape Girardeau CNC and putting them to work in Paraguay with the Peace Corps.

“Luckily, with this volunteer work, they’ve gotten me into a very specific sector, which is environmental conservation, and a specific job, which is environmental education,” she said. “I have my volunteer work here to thank for that.”

## NOT “OUTDOORSY” PEOPLE

In many cases, the love of the outdoors is passed down from one generation to the next. Cindy Taylor discovered her love of nature without significant influence from her parents — beyond being sent outdoors to play as a child.

“My mom and dad were really not outdoorsy people,” said Taylor, who has been a staff volunteer at Powder Valley CNC since 2000. “As a child, we would go to my aunt and uncle’s farm, and we would



fish there. My mom hated it, and my dad would play along, but I don't think he really enjoyed it. But somehow, I got the bug."

As a Powder Valley CNC volunteer, Taylor's duties range from staffing the front desk to helping with children's programs to playing chauffer to Peanut, MDC's semi-retired anti-litter turtle mascot.

"She's the hit of the show," she said. "I'm really just the transportation."

Regardless of what job she's assigned, Taylor sees it as an opportunity to help others make their connections with nature.

"It really comes down to the joy of being in and with nature," she said. "There's something special there that a lot of people don't get to experience, so if I can help someone experience that, that's a joy to me."

## BASKETS AND SPOONS

The volunteers' value in forwarding the conservation mission doesn't stop at the end of the program or when they leave their nature center or range, Hime said.

"I always think of them as our ambassadors in the community," she said. "They're reaching people, socializing with people, interacting with people that maybe we are not — their friends, family, and neighbors. I often think of them as the department's spokespeople within their local communities."

It was through one of those ambassadors that Linda and Jim Strauch connected with their volunteer home of Twin Pines Conservation Education Center (CEC), Winona. Almost immediately after retiring from their jobs in Illinois and moving to Missouri in 2008, they were introduced to Twin Pines CEC.

"We were here for one day," Linda Strauch said. "We moved in on a Saturday, and we went to church Sunday morning. The next day, we met a fellow who was taking the volunteer classes at Twin Pines. Since we love the outdoors and had always volunteered at other things, he said, 'I have the perfect place for you.'"

Less than a week after arriving in Missouri, Linda and her husband Jim were in the volunteer training class at Twin Pines CEC. Experienced hunters and anglers, the two found themselves exploring new outdoor skills, facilitated by the training they received as volunteers.



**A volunteer with Missouri Stream Team removes trash during a clean up.**

"I took a basket weaving class at Twin Pines about eight years ago and it just sort of hit a little hitch with me and I just loved it," she said. "Twin Pines played a big role in my basket making, so now I harvest white oak and make my own white oak strips and weave white oak baskets."

Taking advantage of the native resources on their 10-acre property near Birch Tree, Linda, with her basket weaving, and Jim, who has become an accomplished wood carver, focusing on spoons and paddles, now lead classes in their newfound skills.

## NATURAL CURIOSITY

O'Keefe, whose Christmas bird feeder set him on a course that went far beyond just watching birds, encourages anyone with a natural curiosity to consider volunteering, regardless of their level of knowledge or experience.

"I think if you have a natural curiosity, you don't have to be an outdoorsy person," he said. "There's plenty of folks who have interests and specialties that take them to the nature centers and let them work with kids, families, other adults. Whatever their passion is, there's probably a way to express it with the department." ▲

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*Larry Archer is an editor in MDC's Outreach and Education Division and regular contributor of Missouri Conservationist's monthly Places to Go section. He enjoys time outdoors and is converting his backyard into a pollinator and wildlife haven.*

## Opportunities as Varied as Missouri's Great Outdoors

Whether you're a seasoned hunter, angler, or outdoorsperson, or a nature novice, MDC can help you discover nature through volunteering.

But becoming a staff volunteer, like those in this story, entails more than just signing up, said Syd Hime, MDC volunteer and interpretive program manager.

"It's kind of a formal process," Hime said. "All of our volunteers have to go through an application and interview process, and there is an expectation of a level of commitment."

"That's why we call them staff volunteers — the only thing lacking is a paycheck," she said. "Once they're hired, they have to go through a training."

Staff volunteer needs vary depending on the facility, with some going several years before opening the volunteer recruitment. In cases where the local facility has a full complement of staff volunteers, Hime suggests prospective volunteers look at opportunities with MDC-affiliated groups, including Missouri Stream Team, Missouri Master Naturalists, and Missouri Forestkeepers Network.

More information on volunteer opportunities with MDC and partner programs is available online at [short.mdc.mo.gov/ZJu](http://short.mdc.mo.gov/ZJu).



# *Closing in on*



PHOTOGRAPH BY  
CANDICE DAVIS



# FERAL HOGS

A photograph of two feral hogs behind a metal wire fence. The hogs are looking through the fence, and their faces are partially obscured by the grid. The background shows some autumn leaves and a tree trunk.

DEDICATED FUNDING BRINGS STATEWIDE  
FERAL HOG ELIMINATION WITHIN REACH

by Lauren Hildreth



"Feral hogs are really hard on young deer and on turkey nests."

landowner  
Lavern Daves

A group of feral hogs can destroy a crop field in one night.



**O**n a warm June day, a crew of MDC biologists traveled to document a population of Mead's milkweed, an endangered plant. Like other milkweeds, Mead's serves as critical habitat for the monarch butterfly and other pollinators vitally important to agriculture and wildlife. This population occurs on a remote glade, a unique type of desertlike habitat, in the shadow of Taum Sauk Mountain. The glade holds the largest Mead's milkweed population in Missouri and one of only a few healthy populations remaining in the world. As the biologists walked into the glade, they saw many milkweed flowers but soon noticed damage around the area. Dozens of the milkweed lay strewn about. The biologists looked at each other. "Hogs," they said, almost in unison. Feral hogs, a destructive invasive pest, had not decimated the entire milkweed population — this time. But, until feral hogs are eliminated, this rare plant population will remain vulnerable to their destruction.

### **Destructive, Dangerous, and Costly**

Feral hogs are invasive pests that need to be eliminated from Missouri. A sounder, or group, of hogs can demolish a crop field in one night. The U.S. Department of Agriculture (USDA) estimated that



FERAL HOG: DAVID STONNER; CROP DAMAGE: MARK MCCLAIN



feral hogs cause \$1.5 billion in damage nationwide every year. However, that estimate was made 10 years ago, and the feral hog population around the country has only continued to grow.

Feral hogs became an issue in Missouri in the mid-1990s. A few misguided individuals wanted to establish hog populations for hunting, so they illegally released domestic farm hogs around the state. Between natural reproduction and continued illegal releases, the feral hog population exploded in southern Missouri. They now occur in more than 30 Missouri counties. Feral hog damage is widespread, and it shows up in croplands, pastures, and more. Feral hogs destroy habitats native wildlife depend on, including natural communities like fens, glades, wetlands, and bottomland hardwood forests. Their rooting and wallowing behaviors are the main cause of that destruction. Feral hogs will also eat ground-nesting birds and other wildlife, and they eat nuts, roots, berries, and other natural foods that native wildlife need to survive.

Not only do they physically destroy habitats and agricultural land, they also carry diseases. Swine brucellosis and tularemia are two diseases that humans can contract from feral hogs. They also carry pseudorabies, which can be spread to other wildlife as well as domestic hogs, sheep, cattle, and even pets. If these diseases infected Missouri's domestic swine herd, which is considered disease-free, it could devastate the state's agricultural industry, hurting local economies.

## Many States Have Lost the Battle

Hogs are one of the fastest-multiplying mammals. In some cases, they reach breeding age at six months, and a sow can have two litters and up to 18 piglets in a year. This leads to large populations with a rapid growth rate, as high as 166 percent annually. Because of this high reproductive rate, it is difficult to get an accurate estimate of Missouri's feral hog population. It also makes reducing the population difficult without a strategic and scientific approach.

From what we've seen in Missouri and in other states, we know that hunting is not effective at eliminating feral hogs. Here in Missouri, a shoot-on-sight strategy was encouraged for over 20 years. During that time, the feral hog population continued to grow. Allowing hunting of feral hogs can lead to illegal releases, tempting some misguided individuals to establish new populations. Tennessee witnessed this firsthand.

For 50 years, Tennessee did not allow hunting of feral hogs in any part of the state. There were two isolated populations around fenced hunting preserves, likely escaped hogs from those facilities.



In 1999, a statewide hog season was started on public and private land. Over the next 10 years, populations of feral hogs popped up across the entire state, and the suspected cause of this spread was intentional releases for hunting. This example shows that hunting creates an incentive for people to release feral hogs into new areas. In 2011, Tennessee changed regulations, no longer listed feral hogs as a game species, and banned hog hunting around the state. They are now seeing success with reducing populations.

## Landowners in Missouri are Fighting Back

Feral hogs are a serious problem for many Missouri landowners like Lavern Daves of Wayne County. Daves runs a cattle operation on his land. About five years ago, he spotted feral hog wallows on his field edges. At first, he wasn't too concerned, but then they "swarmed like bees, they were all over the place," Daves said. He immediately reached out to MDC to come trap the hogs. Staff used a drop trap at several locations and, over time, they have removed more than 50 hogs from his property. In addition to the damage to his land, Daves noticed that feral hogs "are really hard on young deer and on turkey nests." His advice to landowners that find themselves with feral hog damage? "As soon as you see sign, call MDC to come trap."

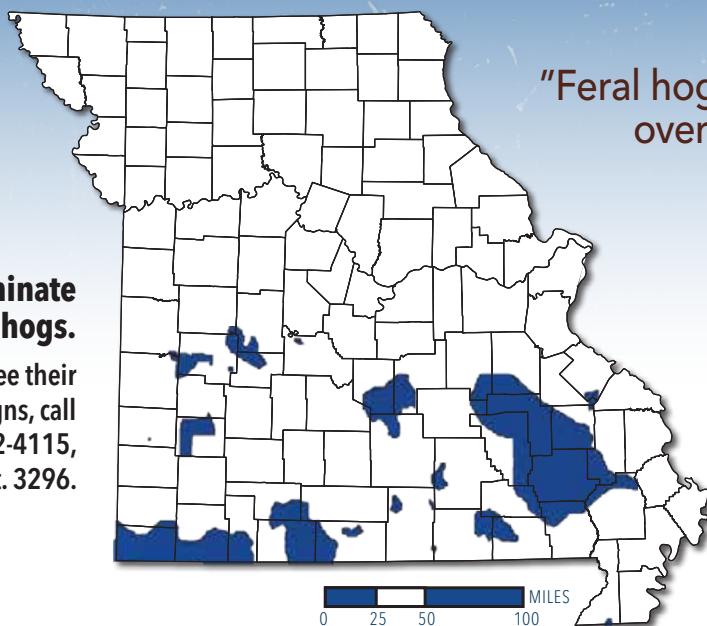
Jeff Hawk, who owns property in Iron County that he manages for recreation, has a slightly different story. He saw hogs around the same time

**MDC biologists review photos on a trail camera to determine hog activity around an active trap.**



## Help eliminate feral hogs.

If you see their signs, call 573-522-4115, ext. 3296.



Blue areas show known feral hog populations as of December 2017

as Daves, about four or five years ago. He spotted them with game cameras, and he saw tracks and rooting on his property. One January, he even noticed that there were no acorns left on the ground — the feral hogs had eaten them all. He tried hunting them, but he was unsuccessful, killing only two hogs. Then the population started growing out of control, the peak of destruction occurring in the spring of 2017. He arrived at his property to find one of his fields destroyed by feral hogs. “Nothing we could do would get them under control,” Hawk said. He picked up the phone and called MDC for help. “They were very responsive and came right out.” MDC staff trapped around 15 hogs, including several pregnant females. He has seen a decrease in the hog population on his property and is quite happy with that. “Feral hogs are an invasive species and take over in nature. They destroy all the food, and native wildlife are highly impacted. They need to be gone.”

## Missouri Aims to Put Up a Fight

The state of Missouri has a multi-agency team that is dedicated to eliminating feral hogs inside our borders. The team pursues a coordinated interagency approach, complete with ever-improving tools and technology. “The cornerstone of the Missouri feral hog elimination effort is partnerships,” said Mark McLain, MDC Feral Hog Elimination Team leader. “Partnerships between government agencies, agricultural and environmental groups, and landowners are the key to removing this damaging invasive pest from Missouri.”

“Feral hogs are an invasive species and take over in nature. They need to be gone.”

landowner Jeff Hawk

The map at left shows where we have seen feral hogs around the state. When citizens report feral hogs, MDC and partners can get an even better idea of where the feral hogs are located. MDC can’t be everywhere at once, so the extra eyes will help increase our knowledge of feral hog distribution. “Without the public’s help, the elimination of feral hogs will be impossible.” McLain said.

## More Funding Ups the Odds of Success

With the devastating effects of feral hogs evident in Missouri, MDC committed \$1.865 million annually, with Missouri Conservation Commission approval, to eliminate feral hogs around the state. This dedicated funding, initially approved for fiscal year 2018, has increased the number of hog trappers on the landscape. “Hog trappers are always looking ahead. Where will this trap move to next? Where can I get bait out?” McLain explained. With that forward thinking, and the added manpower, more landowners can get the assistance they need to fight feral hogs on their property, and more feral hogs can be trapped on public land as well.

The funding also allows staff and partners to purchase more supplies, including traps and the corn required for baiting those traps. Those two pieces are integral in running a successful operation to rid an area of feral hogs. The more carefully placed traps on the ground, the higher likelihood that a feral hog, or two or 50, will find a trap.

## Report — Don’t Shoot!

MDC and its partner agencies are fighting hard against feral hogs, and there are two simple things that you can do to join in the fight. First, report any hog damage you see to MDC as soon as possible. Second, if you see a feral hog in the wild, **Report — Don’t Shoot!** Call 573-522-4115, ext. 3296 to report a sighting or damage, or report online at [mdc.mo.gov/feralhog](http://mdc.mo.gov/feralhog). With more eyes looking for this invasive pest, Missouri can gain more ground in the fight against feral hogs. ▲

*Lauren Hildreth is a program supervisor for the Wildlife Division. She enjoys experiencing Missouri’s outdoors with her family and dog.*





### Testing for Diseases and Origins

The USDA-Wildlife Research Center in Fort Collins, Colorado, processes the feral hog disease testing samples for the state of Missouri. Every year, the lab tests roughly 100 feral hogs taken from around the state for three diseases: classical swine fever (not found in Missouri), swine brucellosis, and pseudorabies (both found in Missouri feral hogs). Using blood samples and the hogs' ears, which provide genetic material, scientists can determine a variety of things, including where specific animals came from, whether instate or out of state.





# Get Outside

in

# DECEMBER

→ Ways to  
connect  
with nature



## Who's Calling?

Both great horned and barred owls are courting this time of year. Can you distinguish their calls? Listen closely. If you hear, "Hoo, hoo-oo, hoo-oo," that's a **great horned owl**. But if you hear, "Who cooks for you? Who cooks for you all?" That's the call of a **barred owl**.



Great horned owl

Barred owl

## Winter Light Show

'Tis the season for epic light shows. But if you're looking for a light show of the more natural variety, head outside on Dec. 13 and catch the Geminid meteor shower. The skies will be alive with meteors coming fast and furious — more than 1 per minute! Peak viewing is at 2 a.m., but the shower will be visible starting at 9 p.m. For optimal viewing, head outside the city, away from light pollution. Find a conservation area near you at [short.mdc.mo.gov/ZSJ](http://short.mdc.mo.gov/ZSJ).

### SOUTHEAST REGION

## Candlelit Woods Walk

Friday, Dec. 14 • 5-8 p.m.

Cape Girardeau Conservation Nature Center

2289 County Park Drive, Cape Girardeau, MO 63701

No registration required. Call 573-290-5218 for more information. All ages

Enjoy the serenity of a winter's night as you stroll along our trail. We'll light the path for you and provide hot beverages for your enjoyment. After your walk, stop inside the nature center to warm up and view our exhibits. Our trail is paved and accessible to wheelchairs and strollers.

### Natural Events to See This Month

Here's what's going on in the natural world.



Snow  
goose  
populations  
peak

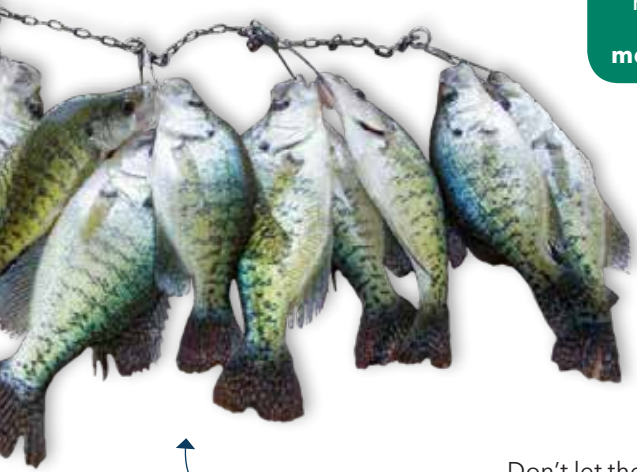


↶  
Fox  
and gray  
squirrels  
breed



Christmas  
ferns are  
green on  
wooded  
slopes





Find more events  
in your area at  
[mdc.mo.gov/events](http://mdc.mo.gov/events)

## Winter Crappie

Don't let the winter chill stop you from wetting your fishing line. **Crappie** are still biting — you may just have to go a little deeper (20 to 40 feet) to find them. For more tips on winter crappie fishing, visit [short.mdc.mo.gov/Zpp](http://short.mdc.mo.gov/Zpp).

ST. LOUIS REGION

## Rifle: Youth .22

Saturday, Dec. 29 • 8 a.m.

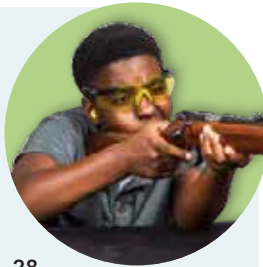
August A. Busch Shooting Range

3550 Hwy D, Defiance, MO 63341

Registration required. Call 636-300-0258 by Dec. 28

Ages 10 and older

Join us to learn about rifle safety, operation, shooting fundamentals, maintenance, and safe storage. Equipment and ammunition provided. You may bring your own firearm and ammunition to the live-fire session. Dress for the weather.



# JOIN THE CHRISTMAS BIRD COUNT

Do you know your birds by sight and sound? Do you own lots of warm clothes? Join the Christmas Bird Count and add to a nationwide citizen science project! There are over 20 Christmas Bird Counts in Missouri alone. If you know your birds well, consider participating.

To learn more, visit  
[tinyurl.com/ybropbvq](http://tinyurl.com/ybropbvq)



**DRESS WARMLY! TAKE SNACKS!  
BIRDS ARE AWESOME!**



## A Pearl of a Mushroom

If you think of mushroom hunting as a springtime activity, time to put your skills to the test. **Oyster mushrooms** fruit year-round, especially after a good rain. These culinary delicacies grow in clusters on logs, trunks, and stumps. It's harvest time!



Bobcats stay  
in shelters  
during deep  
snowfall



Golden  
mice  
huddle  
in nests  
to stay  
warm



# Places to Go

## SOUTHWEST REGION

### Lead Mine Conservation Area

Getting the winter lead out  
by Larry Archer

✳ Given Missouri's history as a leading lead producer, any number of conservation areas in the state's lead belt could make a much more credible claim on the name Lead Mine Conservation Area (CA) than the 7,761 acres in Dallas County that holds the title.

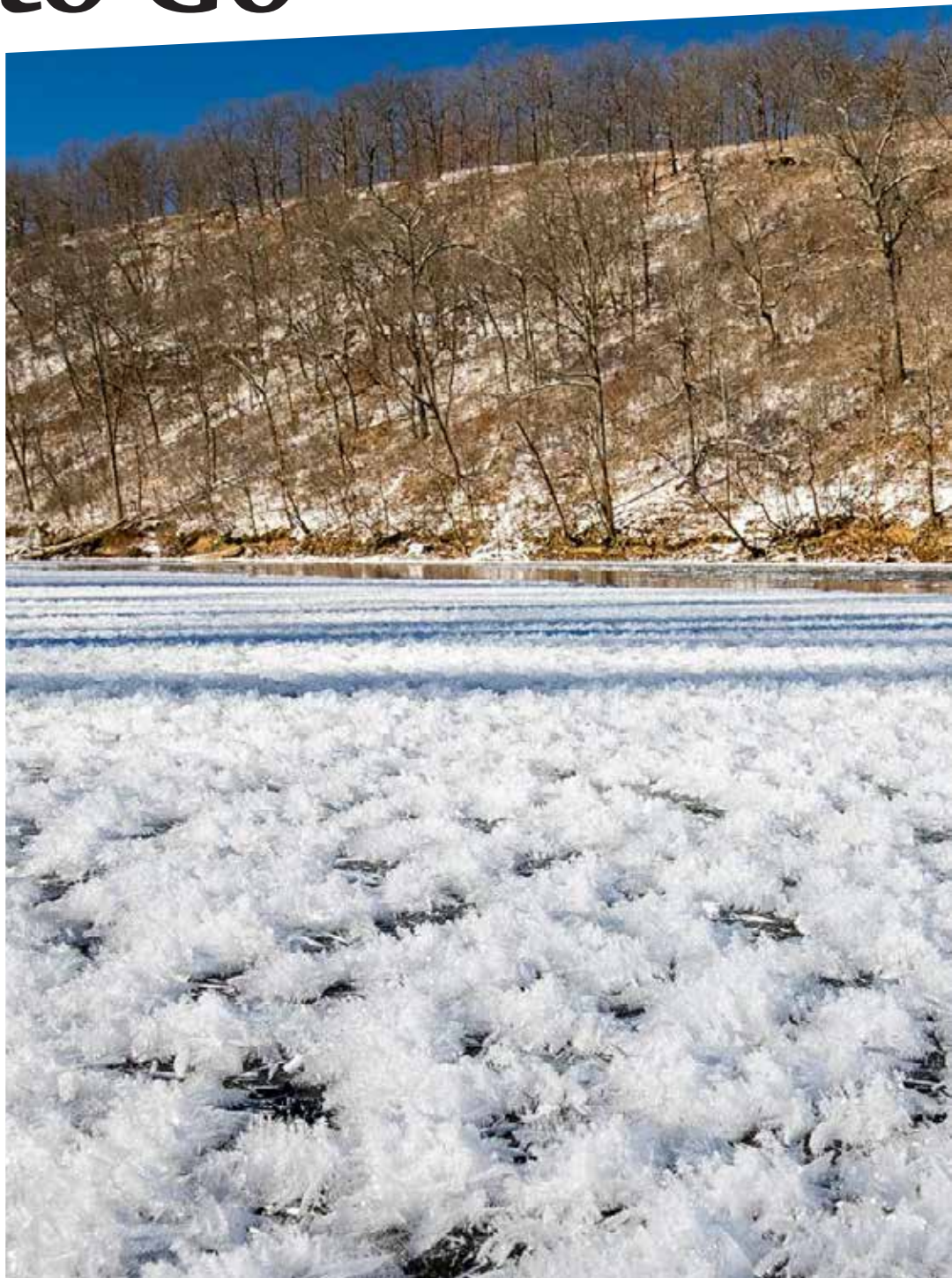
Named for the nearby community of Lead Mine, neither the town nor the conservation area contributed significantly to Missouri's lead mining past, said Resource Forester Steven Laval, Lead Mine CA manager.

"They actually did try to do some surface lead mining there, probably in the late 1800s, early 1900s," Laval said. "I guess they didn't find much."

What the area produces, however, are opportunities for people looking to get the winter lead out. With more than 22 miles of hilly, multi-use trails and a half-mile hiking-only trail, hikers, equestrians, and mountain bikers can find plenty of challenge, Laval said.

"There are a couple of designated hiking trails, but most of the use is equestrian," Laval said.

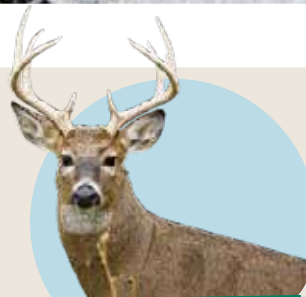
The area's access to more than 2 miles of the Niangua River also offers winter floaters and anglers additional opportunity, he said.



WHAT  
TO  
LOOK  
FOR  
WHEN  
YOU  
VISIT



Dark-eyed junco



White-tailed deer



Coyote





Frost forms on the Niangua River as it flows through Lead Mine CA. The area offers miles of trails and access to the Niangua River for plenty of winter outdoor hiking and fishing.



Northern flicker



Bald eagle



## LEAD MINE CONSERVATION AREA

consists of 7,761 acres in Dallas County. From Plad, take Highway 64 west, then Route T north, and Route YY east 0.50 mile. From Lebanon, take Highway 5 north to Route E, which will become Bluff Trail at the end of pavement. Follow Bluff Trail 0.25 mile to area. There is no vehicle access to the west side of area from the east side.

N37° 49' 44.76" | W92° 57' 12.96"

[short.mdc.mo.gov/Zc5](http://short.mdc.mo.gov/Zc5) 417-895-6880

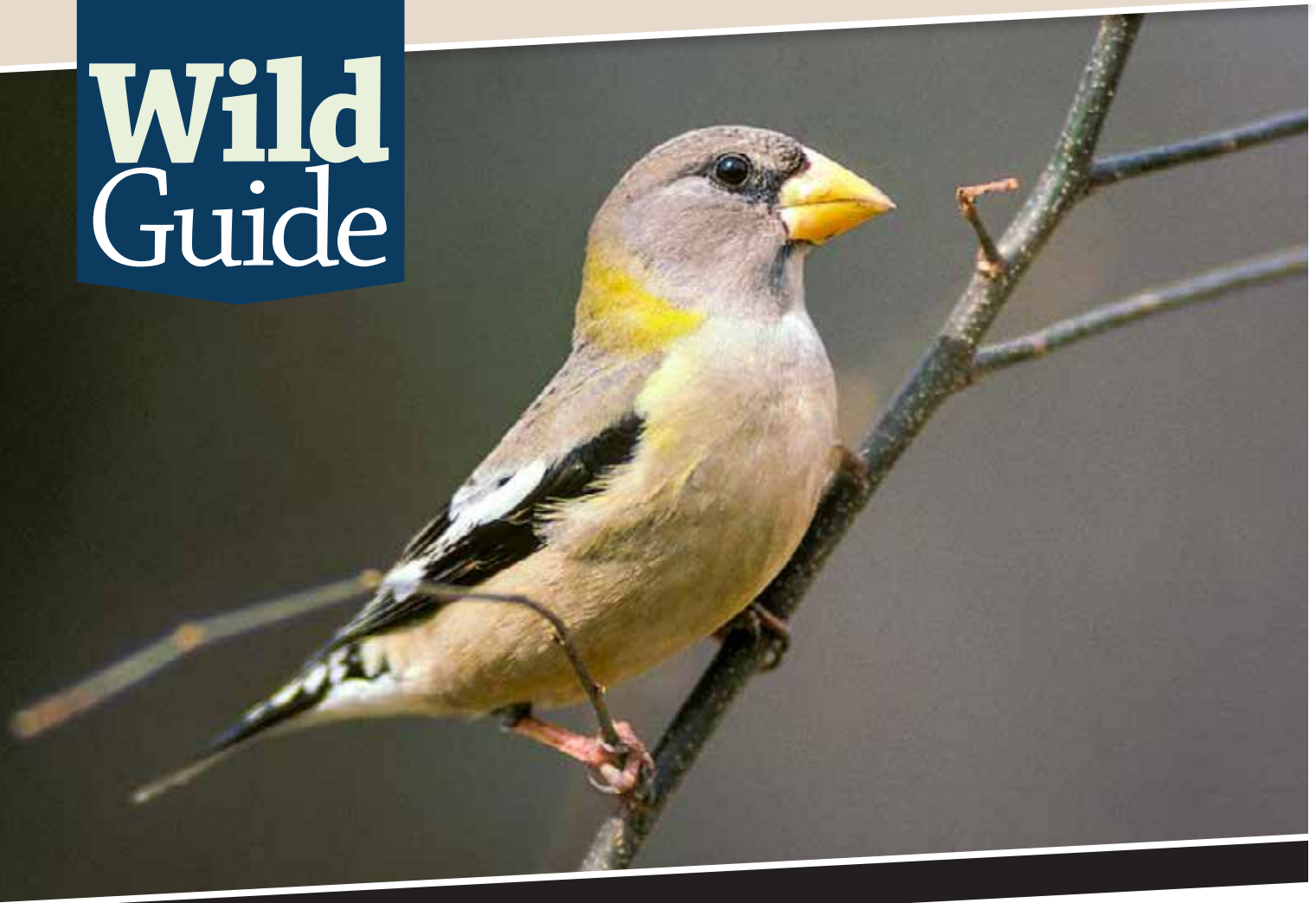
## WHAT TO DO WHEN YOU VISIT

-  **Bird-Watching** Included in the National Audubon Society's Niangua River Basin Important Bird Area ([short.mdc.mo.gov/Zci](http://short.mdc.mo.gov/Zci)) and on the Great Missouri Birding Trail ([short.mdc.mo.gov/Zcw](http://short.mdc.mo.gov/Zcw)). The eBird list of birds recorded at Lead Mine CA is available at [short.mdc.mo.gov/ZcU](http://short.mdc.mo.gov/ZcU).
-  **Boating and Canoeing** One river access and one boat ramp providing access to the Niangua River.
-  **Camping** Individual campsites. No amenities. Group camping by special use permit only.
-  **Fishing** Black bass, catfish, rock bass, suckers, sunfish
-  **Hiking** Five moderate to difficult multi-use (hiking/biking/horseback riding) trails totaling more than 22 miles. One half-mile easy, hiking-only trail.
-  **Hunting Deer and turkey.** Deer and turkey regulations are subject to annual changes. Please refer to the *Spring Turkey* or *Fall Deer and Turkey* booklets for current regulations. Also **quail, rabbit, and squirrel.**
-  **Shooting** Unstaffed rifle and pistol range with 25-, 50-, and 100-yard targets.
-  **Trapping** Special use permit required.

"We have resident eagles that stay around there all the time, particularly down along the river access area."

—Lead Mine CA Manager Steven Laval





## Evening Grosbeak

*Coccothraustes vespertinus*

### Status

Rare, sporadic in winter. Accidental in summer.

### Size

Length: 8 inches

### Distribution

Statewide



### Did You Know?

In the early 1900s, evening grosbeaks expanded their range into the Northeast due in part to an abundant planting of box elder trees. Today, logging and spraying for insect pests may be reducing available habitat and food in their breeding territory.

**M**ale evening grosbeaks are yellow with black wings and tail and a brownish wash on the head and back, while females are grayish tan with black wings and tail. Their large, conical bills are ivory colored. Their song is a hesitant warble, not often heard in Missouri, while their call is a short, harsh *peer* given frequently in flight. Though mistaken for American goldfinches, grosbeaks are the size of a chunky robin as compared to the more diminutive sparrow-sized goldfinch.



### LIFE CYCLE

Evening grosbeaks primarily live in northern North America and the Rocky Mountains, where they breed in coniferous forests. In years when pine seeds are scarce, many of these birds expand their range east and south in the winter. Because they travel in flocks, the sudden, unexpected appearance of grosbeaks at wintertime feeders is a treat for Missouri bird-watchers.



### FOODS

Show-Me birders are likely to get a glimpse of evening grosbeaks at feeders, devouring sunflower seeds. Grosbeaks also favor other seeds and fruits, including box elder and maple, ash, and tulip poplar seeds, plus cherry, apple, crabapple, hawthorn, and juniper fruits. During the breeding season, they switch to insects, which provide extra protein for their nestlings.



### ECOSYSTEM CONNECTIONS

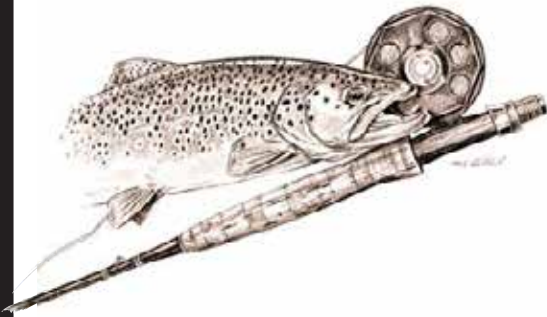
Grosbeaks play an important role in preventing large outbreaks of insects that are considered serious pests. For example, evening grosbeaks eat spruce budworm, which can defoliate acres of balsam firs, spruces, pines, and other conifers.

JIM RATHERT



# Outdoor Calendar

❖ MISSOURI DEPARTMENT OF CONSERVATION ❖



## Free MO Hunting and MO Fishing Apps

MO Hunting makes it easy to buy permits, electronically notch them, and Telecheck your harvest. MO Fishing lets you buy permits, find great places to fish, and ID your catch. Get both in Android or iPhone platforms at [short.mdc.mo.gov/Zi2](http://short.mdc.mo.gov/Zi2).

## FISHING

### Black Bass

Impounded waters and non-Ozark streams:  
Open all year

Most streams south of the Missouri River:  
May 26, 2018–Feb. 28, 2019

### Nongame Fish Gigging

Streams and Impounded Waters,  
sunrise to midnight:  
Sept. 15, 2018–Jan. 31, 2019

### Paddlefish

On the Mississippi River:  
Sept. 15–Dec. 15, 2018

### Trout Parks

Catch-and-Release:  
Nov. 9, 2018–Feb. 11, 2019

## TRAPPING

### Beaver, Nutria

Nov. 15, 2018–March 31, 2019

### Other Furbearers

Nov. 15, 2018–Jan. 31, 2019

### Otters, Muskrats

Nov. 15, 2018–Feb. 20, 2019

### Rabbits

Nov. 15, 2018–Jan. 31, 2019

For complete information about seasons, limits, methods, and restrictions, consult the *Wildlife Code of Missouri* at [short.mdc.mo.gov/Zib](http://short.mdc.mo.gov/Zib). Current hunting, trapping, and fishing regulation booklets are available from local permit vendors or online at [short.mdc.mo.gov/ZZf](http://short.mdc.mo.gov/ZZf).

## HUNTING

### Coyote

*Restrictions apply during April, spring turkey season, and firearms deer season.*

Open all year

### Crow

Nov. 1, 2018–March 3, 2019

### Deer

Archery:

Nov. 21, 2018–Jan. 15, 2019

Firearms:

- ▶ Antlerless Portion (open areas only):  
Nov. 30–Dec. 2, 2018
- ▶ Alternative Methods Portion:  
Dec. 22, 2018–Jan. 1, 2019

### Groundhog (woodchuck)

May 7–Dec. 15, 2018

### Other Furbearers

Nov. 15, 2018–Jan. 31, 2019

### Pheasant

Regular:

Nov. 1, 2018–Jan. 15, 2019

### Quail

Regular:

Nov. 1, 2018–Jan. 15, 2019

### Rabbit

Oct. 1, 2018–Feb. 15, 2019

### Squirrel

May 26, 2018–Feb. 15, 2019

### Turkey

Archery:

Nov. 21, 2018–Jan. 15, 2019

### Waterfowl

See the Waterfowl Hunting Digest or visit [short.mdc.mo.gov/ZZx](http://short.mdc.mo.gov/ZZx) for more information.

### Wilson's (Common) Snipe

Sept. 1–Dec. 16, 2018



ILLUSTRATIONS: MARK RATHIEL





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Zephyr, a Labrador retriever, looks for ducks outside his hunting blind. Duck season runs through January in all three zones. Check out the *Migratory Bird and Waterfowl Hunting Digest 2018-2019* ([short.mdc.mo.gov/Zc3](https://short.mdc.mo.gov/Zc3)) for more information. What will you discover when you venture outside your cozy confines this winter?

by **David Stonner**

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